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The first records of the genus *Tychobythinus* Ganglbauer, 1896 from Georgia (Coleoptera: Staphylinidae: Pselaphinae)

With 14 figures and 1 map

Volker Brachat [1] and Volker Assing [2]

[1] Beethovenweg 19a, 82538 Geretsried, Germany. – vc.brachat@t-online.de
[2] Gabelsbergerstraße 2, 30163 Hannover, Germany. – vassing.hann@t-online.de

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Abstract

Three microphthalmous and presumably locally endemic species of *Tychobythinus* Ganglbauer, 1896, a pselaphine genus previously unknown from Georgia, are described and illustrated: *T. meskheticus* spec. nov. (Southwest Georgia: Meskheti Range), *T. eximius* spec. nov. (Northwest Georgia: Egrisi Range), and *T. egrisicus* spec. nov. (Northwest Georgia: Egrisi Range). *Tychobythinus eximius* is particularly remarkable in that it is subject to a unique sexual dimorphism of the antennae and the pronotum. Including the new species, *Tychobythinus* is now represented in the Palaearctic region by 95 named species and two subspecies.

Taxonomic acts

Tychobythinus meskheticus spec. nov. – urn:lsid:zoobank.org:act:A78FDE50-5CB5-4A5F-9739- 1ECB2FC57081
Tychobythinus eximius spec. nov. – urn:lsid:zoobank.org:act:A40D98AE-8D81-49E6-A33E-730180CB3010
Tychobythinus egrisicus spec. nov. – urn:lsid:zoobank.org:act:D6B42232-D049-4541-8A5A-9E7D92C612DC

Key words

Coleoptera, Staphylinidae, Pselaphinae, Bythinini, *Tychobythinus*, Caucasus region, Georgia, taxonomy, review, new species, sexual dimorphism, distribution map

Zusammenfassung

Drei microphthalme und vermutlich lokalendemische Arten der zuvor aus Georgien unbekannten Gattung *Tychobythinus* Ganglbauer, 1896 werden beschrieben und abgebildet: *T. meskheticus* spec. nov. (Südwest-Georgien: Meskheti Range), *T. eximius* spec. nov. (Nordwest-Georgien: Egrisi Range) und *T. egrisicus* spec. nov. (Nordwest-Georgien: Egrisi Range). *Tychobythinus eximius* ist durch einen bemerkenswerten Sexualdimorphismus der Fühler und des Pronotums ausgezeichnet. Einschließlich der neuen Arten ist *Tychobythinus* in der Paläarktis derzeit mit 95 beschriebenen Arten und zwei Unterarten vertreten.

Schlüsselwörter

Coleoptera, Staphylinidae, Pselaphinae, Bythinini, *Tychobythinus*, Kaukasusregion, Georgien, Taxonomie, neue Arten, Sexualdimorphismus, Verbreitungskarte

Introduction

According to Schülke & Smetana (2015), the Holarctic genus *Tychobythinus* Ganglbauer, 1896 was represented in the Palaearctic region by 86 species (plus two subspecies), four of them confined to the East Palaearctic (Japan, China, Taiwan) and the remainder distributed in the West Palaearctic region. In the meantime, six additional species have been described from Greece, Italy, and Turkey (Brachat 2019, Hlaváč & Faille 2018, Poggi & Magrini 2015, Sabella et al. 2019, 2020). Only four species were previously known from the Caucasus region sensu lato: *T. caviceps* (Reitter, 1881) (Azerbaijan, Iran), *T. clermonti* (Jeannel, 1950) (Russian West Caucasus), *T. loebli* Hlaváč & Faille, 2018 (Northeast Turkey: Trabzon), and *T. repens* Kurbatov, 2006 (Russian West Caucasus) (Kurbatov 2006). The genus had never been reported from Georgia.

Some *Tychobythinus* species have strongly reduced eyes and are found by extracting deep litter layers and soil by sifting or soil-washing; several microphthalmous species have exclusively been collected in caves.

While the ventral side of the head is generally sexually dimorphic in *Tychobythinus* species, a sexual dimorphism of the antennae had been observed only in the two species from the Krasnodar region in the Russian West Caucasus (*T. clermonti*, *T. repens*). A pronounced sexual dimorphism of the pronotum was previously unknown in the genus.

Ten field trips conducted to Georgia conducted by Heinrich Meybohm (Großhansdorf), Michael Schülke (Berlin), and the authors since 2015 yielded a total of 28 specimens of *Tychobythinus*. Examination of this material revealed that it is composed of probably six undescribed species, three of which are represented exclusively by females. The three species of which males are available, all of them microphthalmous and most likely locally endemic, are described in the present study. One of them is characterised by unique modifications of the male antennae and the male pronotum.

Material and methods

The material treated in this study is deposited in the following collections:

cAss	Private collection Volker Assing, Hannover
cBra	Private collection Volker Brachat, Geretsried
MNB	Museum für Naturkunde, Berlin (coll. Schülke)

The morphological studies were conducted using Stemi SV 6 (Zeiss) and Discovery V12 (Zeiss) microscopes, and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using digital cameras (Axiocam ERc 5s, Nikon Coolpix 995), as well as Labscope and Picolay software. The map was created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the apex of the abdomen, the length of the aedeagus from the apices of the parameres to the base of the aedeagal capsule. Other measurements are abbreviated as follows:

HL – head length from the anterior margin of the frons to the posterior constriction of the head; HW – head width across and including eyes; PpL – length of maxillary palpomere IV; PL – length of pronotum; EL – length of elytra along suture; EW – maximal width of both elytra combined.

The "parameral" side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect. Morphological terminology mostly follows Chandler (2001).

Descriptions of new species

Tychobythinus meskheticus spec. nov.

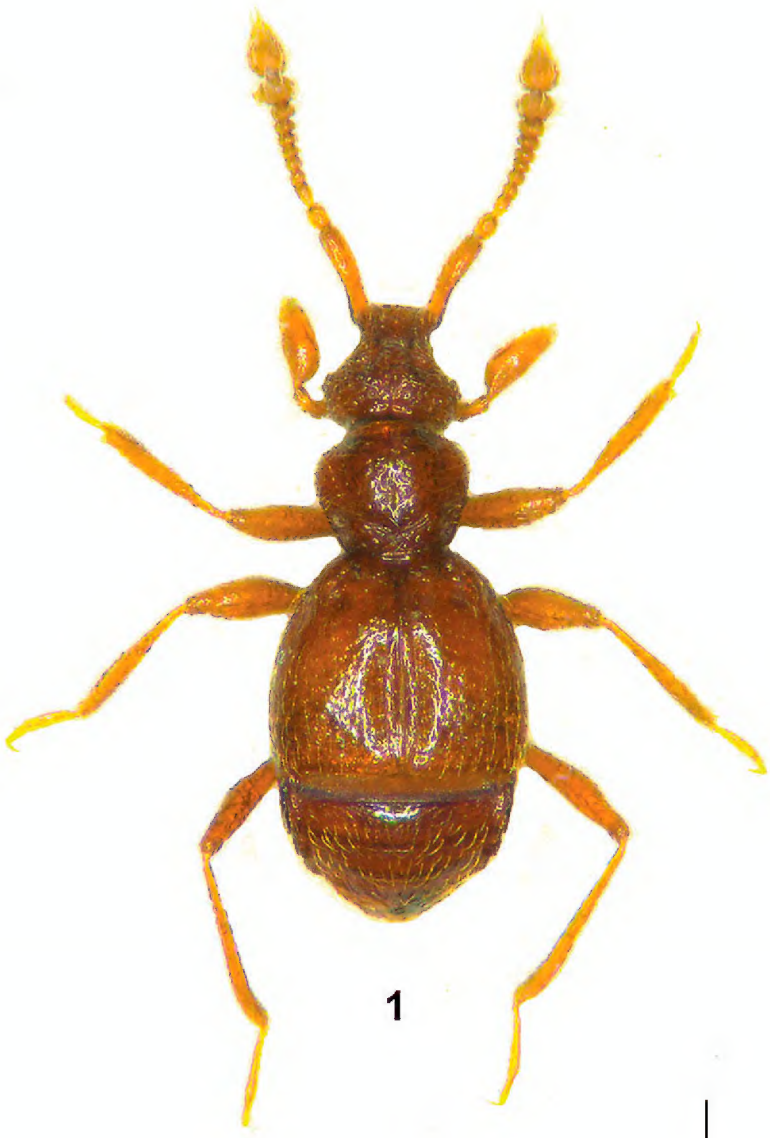
urn:lsid:zoobank.org:act:A78FDE50-5CB5-4A5F-9739- 1ECB2FC57081

(Figs 1–2, 12, Map 1)

Type material: Holotype ♂: "N41°54'25 E42°25'44 GG Guria Kvabgha–Zoti 680 m soil washing 16.5.2019 leg. Meybohm & Brachat (18a) / *Tychobythinus meskheticus* spec. nov. ♂ det. Brachat 2022 / Holotypus" (cBra). Paratypes: 1 ♂, 2 ♀♀: same data as holotype (cBra); 3 ♀♀: "N41°54'25 E42°25'44 GG Guria Kvabgha–Zoti 680 m 16.5.2019 leg. Meybohm & Brachat (18)" (cAss, cBra).

Etymology: The specific epithet is an adjective derived from Meskheti, the name of the mountain range where the species was discovered.

Description: Habitus as in Fig. 1. Body length 1.3–1.4 mm. Body reddish-brown with the legs, antennae, and maxillary palpi slightly paler. Pubescence whitish, nearly depressed. Head weakly oblong (HL: 0.28–0.30 mm; HW: 0.26–0.28 mm); punctation dense and coarse; frontal lobe 0.16–0.17 mm wide; frontal sulcus broad. Eyes strongly reduced, composed of 2–4 ommatidia without pigmentation. Maxillary palpi



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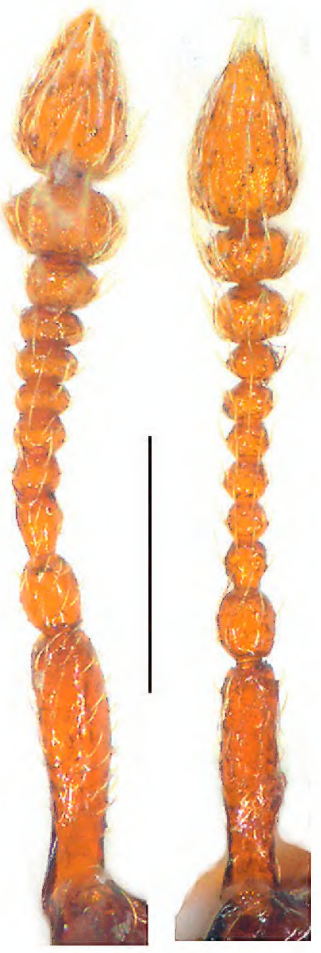

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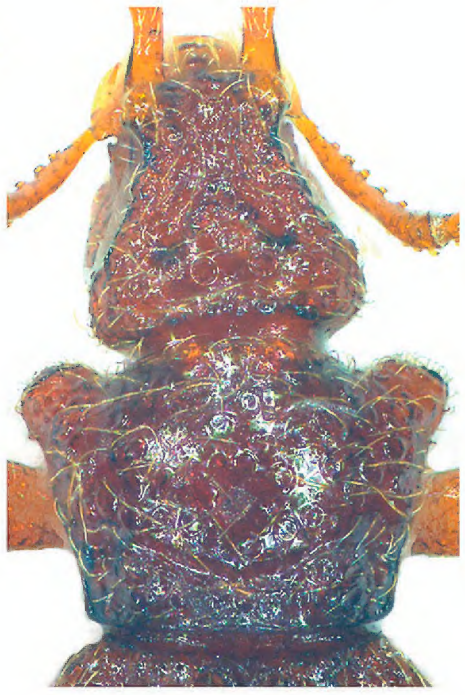

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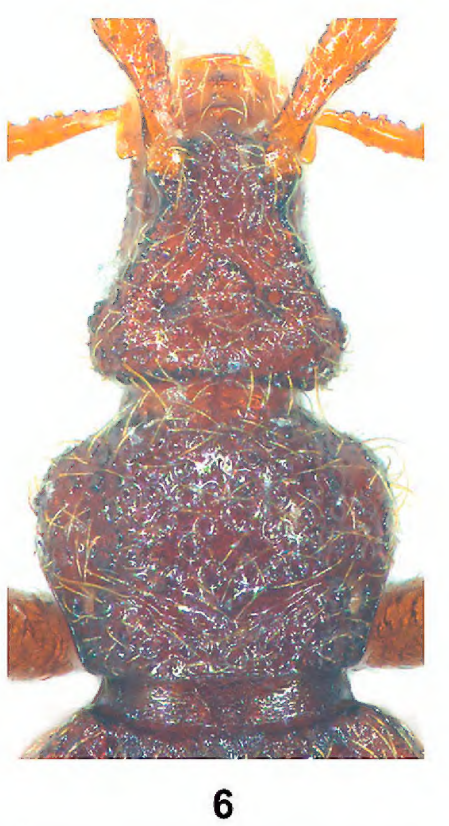

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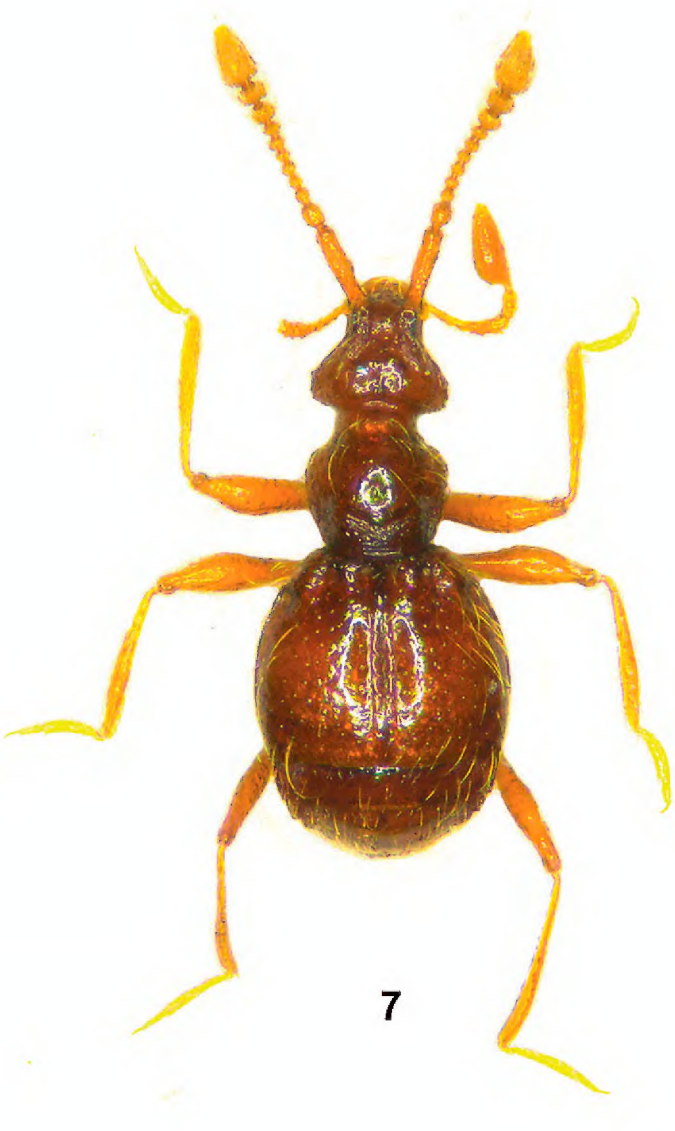

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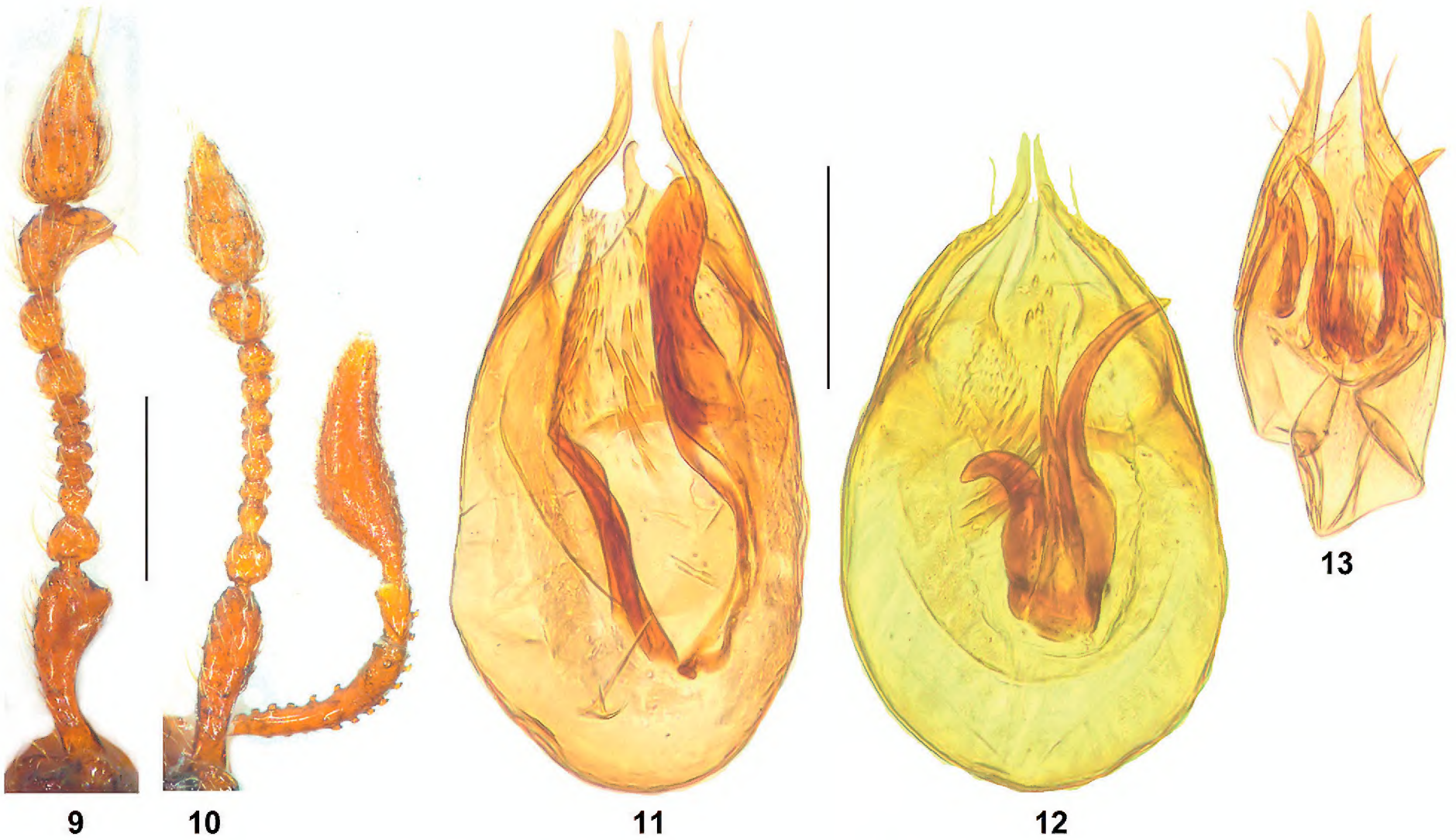
Figs 1–8: *Tychobythinus meskheticus* (**1–2**), *T. eximius* (**3–6**), and *T. egrisicus* (**7–8**). 1, 3, 7 – male habitus; 2, 8 – male antenna; 4 – female habitus; 5 – male head and pronotum; 6 – female head and pronotum. Scale bars: 1, 3–4, 7: 1.0 mm; 5–6 – 0.5 mm; 2, 8: 0.2 mm.



Figs 9–13: *Tychobythinus eximius* (**9–11**), *T. meskheticus* (**12**), and *T. egrisicus* (**13**). 9 – male antenna; 10 – female antenna and maxillary palpus; 11–13 – aedeagus in dorsal view. Scale bars: 9–10: 0.2 mm; 11–13: 0.1 mm.

Fig. 14: Habitat where four type specimens of *Tychobythinus eximius* were found (Zemo Svaneti: Lebarde valley; 540 m). They were sampled at the margins of the large rocks.

long; palpomeres II and III with numerous pronounced tubercles; palpomere IV approximately three times as long as broad (PpL: 0.24–0.26 mm).
Pronotum transverse (PL: 0.30 mm; PW: 0.37 mm), broadest in anterior third, laterally finely carinate; lateral margins strongly convex in dorsal view; punctation coarse.
Elytra transverse (EL: 0.47–0.48 mm; EW: 0.63–0.66 mm), with partly rugose punctation. Abdomen 0.22 mm long.
♂: head ventrally with large and deep transverse impression, posterior margin of this impression laterally with an erect process on either side and in the middle with an erect lamella, behind impression with two long and erect setae; antenna (Fig. 2) 0.74 mm long; antennomere I 0.24 mm long and four times as long as broad; antennomeres VII–X somewhat asymmetric; aedeagus 0.30 mm long and shaped as in Fig. 12.
♀: antenna 0.66 mm long; antennomere I 0.18 mm long and three times as long as broad.

Comparative notes: *Tychobythinus meskheticus* is distinguished from its geographically closest congeners *T. clermonti*, *T. repens* (Russian West Caucasus: Krasnodar region), and *T. loebli* (Northeast Turkey: Trabzon) by different modifications of the antennae and the structure of the aedeagus. For illustrations of the aedeagi of the compared species see Kurbatov (2006) and Hlaváč & Faille (2018).

Distribution and natural history: The type locality is situated in the northern slopes of the Meskheti Range, Guria, Southwest Georgia (Map 1). The specimens were collected by sifting deep litter and by washing stony soil under bushes near a stream at an altitude of 680 m.

Tychobythinus eximius spec. nov.

urn:lsid:zoobank.org:act:A40D98AE-8D81-49E6-A33E-730180CB3010
(Figs 3–6, 9–11, 14, Map 1)

Type material: Holotype ♂: "GEORGIA [56] – Zemo Svaneti, N Martvili, Lebarde valley, 42°37'34"N, 42°24'28"E, 580 m, 16.X.2021, V. Assing / *Tychobythinus eximius* spec. nov. ♂ det. Brachat 2022 / Holotypus" (cBra). Paratypes: 1 ♀: "GEORGIA [56a] – Zemo Svaneti, N Martvili, Lebarde valley, 42°37'34"N, 42°24'28"E, 580 m, 16.X.2021, V. Assing" (cBra); 3 ♂♂: "GEORGIA [58a] – Zemo Svaneti, N Martvili, Lebarde valley, 42°37'51"N, 42°24'20"E, 540 m, 17.X.2021, V. Assing" (cAss, cBra); 1 ♂: same data, but sifted, leg. Schülke (MNB).

Etymology: The specific epithet (Latin, adjective: extraordinary, exceptional) alludes to the unique sexual dimorphism of the pronotum and the antennae.

Description: Habitus as in Figs 3–4. Body length 1.3–1.4 mm. Body reddish-brown, with yellowish, nearly depressed pubescence.
Head (Figs 5–6) oblong (HL: 0.30–0.32 mm; HW: 0.26–0.28 mm); punctation dense and coarse; frontal lobe 0.16 mm broad; frontal sulcus rather narrow and distinct. Eyes strongly reduced, composed of 0–2 ommatidia without pigmentation. Maxillary palpi (Fig. 10) long; palpomeres II and III with pronounced tubercles; palpomere IV 0.23–0.26 mm long, outer side weakly concave.
Pronotum (Figs 5–6) subject to pronounced sexual dimorphism, laterally finely carinate, with coarse punctation. Elytra (EL: 0.54–0.55 mm; EW: 0.64–0.65 mm) densely punctate.
Abdomen 0.16 mm long.
♂: head ventrally with transversely oval impression, lateral margins of this impression with an erect process on either side, posterior margin with a lamella, behind impression with two very long and erect setae; antenna (Fig. 9) approximately 0.8 mm long, strongly modified; antennomere I (length 0.20 mm) curved ventrad, gradually dilated in apical third, approximately 2.5 times as long as broad; antennomere X of conspicuous shape; pronotum (Fig. 5) conspicuously modified, of trapezoid shape, broadest anteriorly, and with somewhat protruding anterior angles; protibia broadened in distal two-thirds; aedeagus 0.32–0.33 mm long and shaped as in Fig. 11.
♀: antenna (Fig. 10) 0.7 mm long; antennomere I slender, 0.20 mm long, more than three times as long as broad; pronotum (Fig. 6) unmodified, broadest at anterior third.

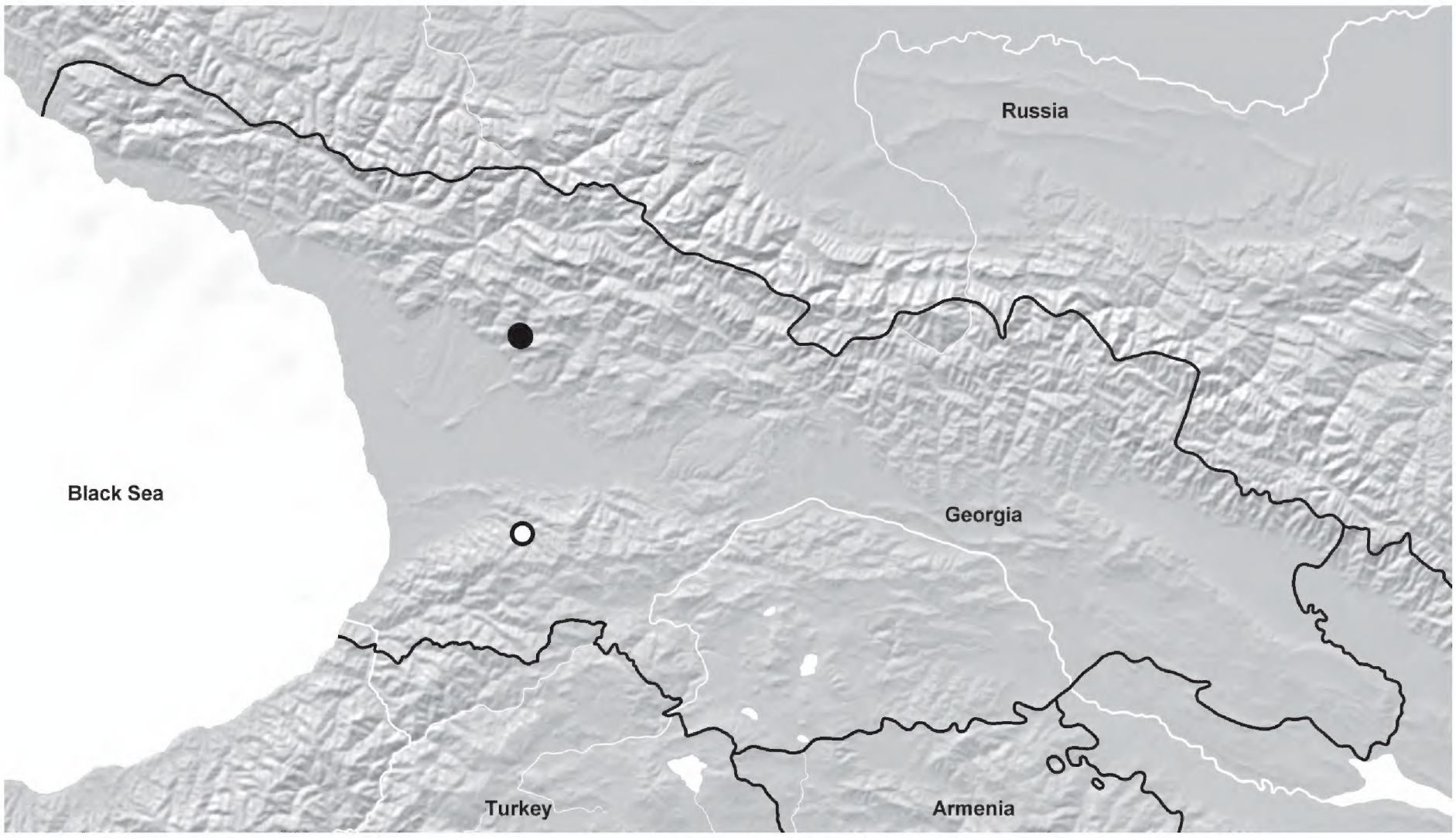
Comparative notes: *Tychobythinus eximius* is readily distinguished from all other species of the genus by the conspicuous modifications of the male antennae, a uniquely modified male pronotum, and the structure of the aedeagus.

Distribution and natural history: The species was discovered in two close localities in the southern slopes of the Egrisi Range, Zemo Svaneti, Northwest Georgia (Map 1). The specimens were collected by sifting deep litter (two specimens) and soil-washing (four specimens) in a deciduous forest margin, mostly near large rocks (Fig. 13), in one locality together with *T. egrisicus*. The altitudes range from 540 to 580 m.

Tychobythinus egrisicus spec. nov.

urn:lsid:zoobank.org:act:D6B42232-D049-4541-8A5A-9E7D92C612DC
(Figs 7–8, 13, Map 1)

Type material: Holotype ♂: "GEORGIA [56a] – Zemo Svaneti, N Martvili, Lebarde valley, 42°37'34"N, 42°24'28"E, 580 m, 16.X.2021, V. Assing / *Tychobythinus*



Map 1: Distributions of named *Tychobythinus* species in Georgia: *T. meskheticus* (whitAe circle), *T. eximius*, and *T. egrisicus* (both blackcircles).

egrisicus spec. nov. ♂ det. Brachat 2022 / Holotypus" (cBra).

Etymology: The specific epithet is an adjective derived from Egrisi, the name of the mountain range where the species was discovered.

Description: Habitus as in Fig. 7. Body length 1.3 mm. Body reddish-brown, with long and suberect pubescence.
Head transverse (HL: 0.28 mm; HW: 0.31 mm), with scattered punctation; frontal lobe 0.15 mm broad; frontal sulcus broad. Eyes strongly reduced, composed of three minute and weakly defined ommatidia without pigmentation. Maxillary palpi long; palpomeres II and III with several fine tubercles; palpomere IV 0.20 mm long, slightly more than twice as long as broad. Pronotum laterally finely carinate, with scattered punctation on disc, near posterior margin more densely punctate. Elytra distinctly transverse (EL: 0.48 mm; EW: 0.71 mm), with fine and indistinct punctation. Abdomen 0.23 mm long.
♂: head ventrally with a transverse impression, behind this impression with four very long and erect setae; antenna (Fig. 8) slender, 0.7 mm long, without evident modifications; antennomere I four times as long as broad (length 0.20 mm); aedeagus 0.24 mm long and shaped as in Fig. 13.
♀: unknown.

Comparative notes: *Tychobythinus egrisicus* is distinguished from all its congeners by the morphology of the aedeagus, particularly the shapes of the internal structures. It additionally differs from the two other species described in this paper by unmodified male antennae, finer and sparser punctation of the forebody, a transverse head, and more strongly transverse elytra, and from the two species recorded from the Krasnodar region by unmodified antennae.
Tychobythinus caviceps from Azerbaijan and Iran, with which the new species shares unmodified male antennae, is characterised by an aedeagus with internal structures of distinctive shapes (see illustration in Kurbatov 2006).

Distribution and natural history: The type locality is identical to that of *T. eximius*. The holotype was collected by washing soil from a margin of a deciduous forest with predominant alder and hazelnut with rocks near a mountain track at an altitude of 580 m.

Acknowledgements

We are indebted to Heinrich Meybohm (Großhansdorf) for the generous gift of the Pselaphinae collected by him during numerous field trips to Georgia. Michael Schülke (Berlin) made a male of *T. eximius* available. Benedikt Feldmann (Münster) and Heinrich Meybohm proofread and reviewed the manuscript. Their comments and suggestions are appreciated.

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